

Choosing a Final Year Project Dissertation

2024

Further Guidance, FAQs, and Indicative Projects



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Overall guidance - all pathways

For a final year project for a degree apprentice, the goal is to encapsulate the breadth of knowledge and skills acquired throughout the apprenticeship.

You should aim to work on a project that requires a holistic approach, combining technical skills with strategic thinking. The project should provide opportunities for apprentices to demonstrate their ability to work independently, manage complex projects, and deliver solutions that meet the needs of real-world organisations. It's important that the chosen project aligns with the strategic objectives of your employer or a client and that it provides the opportunity to demonstrate the specialist knowledge and skills for the chosen pathway.

Summary Table

Specialism	Area of Competence	Typical Project
Software Engineer	Use software development processes, including the knowledge, skills, and professional competences necessary to practice as a software engineer in a business environment.	<p>This could be a project to design and develop a significant piece of software or a new software product prototype to achieve defined business objectives, for a defined user group or customer group, using one of the defined languages, within defined business processes, and applying appropriate levels of security.</p> <p>It will include significant project planning including estimations of both time and cost to proposed solutions, including technical and commercial aspects of the proposed solution.</p>
Tech Consultant	Perform technical, organisational, and process improvement tasks in a range of environments to solve business problems.	<p>This could be a project to undertake an IT consultancy project to formulate and evaluate technical alternatives to meet businesses requirements. This will likely include issues of integration with existing technology and procedures, maintenance and expansion and the consideration of both proprietary and open-source solutions as appropriate.</p> <p>It will include significant project planning including estimations of both time and cost to proposed solutions, including technical and commercial aspects of the proposed solution.</p>
Data Analyst	Use a range of analytical techniques such as data mining, time series forecasting and modelling techniques to identify and predict trends and patterns in data.	<p>This could be a project to analyse, devise and deploy data analytics solutions for a real-world problem domain. In particular, applying data analysis techniques and processes, as well as applying the tools readily available to perform analytics for data-driven decision making. It will include significant project planning including estimations of both time and cost to proposed solutions, include technical and commercial aspects of the proposed solution</p>

Cyber Security Analyst	<p>using a range of technologies and processes to prevent, detect and manage cyber threats, identify risks and respond to incidents.</p>	<p>Cybersecurity analysis is a crucial aspect of protecting digital assets. Final Year Cybersecurity Projects focus on identifying vulnerabilities within a system, analyzing potential threats, and implementing solutions to mitigate risks. Some project ideas include vulnerability assessments of websites, penetration testing, or developing a security analysis tool that scans for weaknesses in real-time.</p> <p>For your Cybersecurity Analysis Projects, you can work on creating systems that can detect and analyze security breaches and alert system administrators.</p> <p>Final Year Cyber Security Projects allow students to dive into the core aspects of network security and ethical hacking, offering them the chance to explore vulnerabilities in network systems and learn how to safeguard them against potential attacks.</p>
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FAQs

Q: Can I write up a project I have done in the past? No. You can develop or continue a previous or current project, but writing up one that has already been completed won't achieve the aims of a final year project.

Q: Can my project be part of a bigger piece of work? Yes. In some cases, the apprentice has been assigned a series of tasks within a big project carried out through collaborations of different teams. Often, the big project will not come to an end before Ada's deadline. This is ok.

In such circumstances, the apprentices should present their parts/roles within the big project as their dissertation project, as long as they

- Clearly specify their sole contribution to the big project
- Clearly specify the goals/objectives that they are responsible for
- Show how their contribution fits into the big project.

Q: Aspects of the project I want to work on are highly confidential/ sensitive - can I still use this as a dissertation project? Yes - confidential information can be redacted, and your supervisor will be able to advise on this. It's important to note that sufficient detail needs to be included to meet the criteria.

Q: Can I come up with the project myself or does it have to be a piece of work I have been assigned to?

Apprentices can absolutely come up with the project themselves, but they should do this in discussion with their line manager/team. It's also important that they have access to the resources needed to deliver the project. This might be data, tools, software, access to colleagues or clients etc. The apprentice should not attempt to design and deliver a project working completely in isolation.

Q: Can I work on a project that is independent of what I do in the workplace? The project you work on should align to the needs of the business. If you are still struggling with a project aligned to business needs after reading this guidance, please reach out to a member of the teaching team.

Indicative Projects

IMPORTANT: These can be referred to if the apprentice is unsure how to proceed.

The aim of providing this list is to help apprentices and employers define their own suitable projects.

This list should not constrain you and in all cases the emphasis should be on being able to meet the marking criteria and demonstrate the KSBs for your specialism. The project an apprentice chooses may be a blend of these or something entirely different. Many of the ideas below may not be appropriate in the apprentice's context, for example.

Tech Consultant

Digital Transformation Strategy Development: Develop a digital transformation strategy for a small to medium-sized enterprise (SME) looking to modernise its operations. This project would involve analysing the current technological landscape of the business, identifying areas for improvement, and proposing a roadmap for digital integration that includes e.g. cloud computing, AI, and data analytics solutions. The apprentice would need to consider the organisational culture, budget constraints, and long-term business objectives, providing a balanced view of innovative technologies and practical implementation plans.

Development of a Sustainable IT Strategy: Create a sustainable IT strategy that aligns with an organisation's environmental goals. This project would explore the environmental impact of the company's current IT infrastructure and practices, including energy consumption, electronic waste, and resource utilisation. The apprentice would research and propose eco-friendly technologies and practices, such as cloud computing, virtualisation, and green procurement policies. The project would balance technical feasibility, cost considerations, and environmental benefits.

Implementation of a Business Intelligence Solution: Implement a business intelligence (BI) solution for an organisation seeking to enhance its decision-making processes. This project would involve identifying key data sources within the organisation, selecting appropriate BI tools, and designing dashboards and reports to provide actionable insights. The apprentice would need to work closely with stakeholders to understand their information needs and train users on how to utilise the BI system effectively.

Development of a Tech Startup Advisory Service: To develop a consultancy service aimed at supporting tech startups. This project would require the apprentice to research the common challenges faced by startups, such as funding, product development, and market entry strategies. The apprentice would then develop a range of consultancy services tailored to these needs, including business planning, technology selection, and growth

hacking strategies. This project would also involve creating a business model for the advisory service, including pricing strategies and marketing plans.

Cloud Migration Strategy for SMEs: Offer consultancy services to small and medium-sized enterprises (SMEs) on transitioning their IT infrastructure to the cloud. The project encompasses evaluating the current IT setup, presenting different cloud solutions, outlining the migration process, and highlighting the benefits in terms of scalability, cost reduction, and enhanced collaboration.

Regulatory Compliance and Data Protection: Advise a client on achieving compliance with data protection regulations such as GDPR. The consultancy includes auditing current data handling practices, recommending improvements to ensure compliance, and training staff on data protection measures.

Custom Software Solution Development: Work with a client to identify specific business challenges that could be addressed through custom software development. This involves gathering and analysing requirements, advising on the software development lifecycle, and guiding the selection of technologies and frameworks that best meet the project's goals.

Digital Workflow Enhancement Project: Guide a client through the enhancement of their digital workflows to streamline operations and improve efficiency. This involves analysing existing processes, identifying inefficiencies, and recommending technology solutions like workflow automation tools. The project includes risk assessment, cost-benefit analysis, and providing training for staff on new systems.

Strategic IT Infrastructure Review and Optimization: Conduct a comprehensive review of a company's IT infrastructure to identify optimization opportunities for enhanced performance and cost savings. This project entails assessing current hardware, software, and network systems, recommending upgrades or changes, and developing a phased implementation plan that minimises disruption to business operations.

Customer Relationship Management (CRM) System Implementation: Advise a business on selecting and implementing a CRM system tailored to its unique needs to improve customer engagement and sales. This includes requirements gathering, system customization, risk management, and training employees on how to use the CRM effectively to achieve business objectives.

E-commerce Strategy and Platform Development: Advise a retail client on developing a comprehensive e-commerce strategy to expand their online presence and sales. This includes market analysis, platform selection, digital marketing strategies, and integrating e-commerce solutions with existing business processes to enhance customer experience and streamline operations.

Regulatory Compliance and Technology Alignment Project: Provide consultancy services to ensure a client's technology stack is in compliance with industry standards and regulations. This project involves a thorough review of current technologies, processes, and data handling practices, recommendations for compliance solutions, and training for staff to maintain ongoing compliance.

Ideas for projects specifically suited to working internally within a business:

Internal Knowledge Management System Enhancement: Develop and implement improvements to the company's existing knowledge management system to enhance information sharing, collaboration, and retrieval among employees. This project could involve assessing current system usage, identifying gaps or inefficiencies, and integrating new features or technologies such as AI-driven search capabilities or collaboration tools. The apprentice would also develop training materials and conduct sessions to help staff effectively use the upgraded system.

Cybersecurity Audit and Response Plan: Conduct a comprehensive internal cybersecurity audit to identify vulnerabilities and potential threats within the company's IT infrastructure. Based on the findings, the apprentice would develop a detailed cybersecurity response plan, including preventive measures, employee training programs on security best practices, and protocols for responding to security breaches. This project aims to bolster the company's cybersecurity posture and ensure business continuity.

Internal Process Automation Initiative: Identify repetitive, time-consuming tasks across various departments that can be automated using software solutions such as Robotic Process Automation (RPA) tools. The project includes mapping out the processes, selecting appropriate automation tools, developing the automation scripts, and measuring the impact on efficiency and accuracy. The apprentice would also be responsible for training relevant staff on interacting with the new automated processes.

Green IT Initiative: Launch a project aimed at reducing the company's carbon footprint through more sustainable IT practices. This could involve conducting an audit of current IT operations to identify areas where energy consumption could be reduced, such as by switching to energy-efficient hardware or implementing server virtualization. The apprentice would research best practices, develop a plan for implementing green IT initiatives, and create awareness programs to encourage employees to adopt more sustainable practices.

Internal Training and Development Portal: Design and develop an internal portal that centralises training resources, courses, and professional development opportunities for employees. This project would require the apprentice to assess current training materials and methods, design a user-friendly interface, and curate or create content that meets the diverse needs of the company's workforce. The portal could also include

features for tracking learning progress and feedback mechanisms to continuously improve the training offerings.

IT Service Desk Enhancement Project: Evaluate the effectiveness of the current IT service desk, identifying areas for improvement in response times, issue resolution rates, and customer satisfaction. The project might involve implementing a new ticketing system, integrating chatbots for faster initial responses, and developing a knowledge base that allows employees to resolve common issues independently. The apprentice would also create guidelines and train IT support staff on using the new tools and processes effectively.

Software Engineer

Projects should allow apprentices specialising in software engineering to apply their skills in analysis, design, development, testing, and deployment. These projects emphasise the importance of engineering principles in creating secure, efficient, and high-quality software solutions.

Custom Software Solution for Business Process Optimization: Undertake the development of a custom software solution designed to automate and optimise a specific business process within the company. The apprentice may, for example, gather and analyse requirements from stakeholders, design a scalable and secure system architecture, and implement the solution using modern programming languages and development methodologies. Rigorous testing will ensure the software meets all functional and non-functional requirements.

Development of a Data Analytics Dashboard: Create a versatile data analytics dashboard that can be customised for various departments within the company, such as sales, marketing, or operations. The apprentice may, for example, design an intuitive user interface, develop data integration pipelines to gather data from multiple sources, and implement visualisation tools to present actionable insights in real-time.

Cross-Platform Mobile App for Employee Engagement: Design and develop a cross-platform mobile application to enhance employee engagement and communication. The apprentice may, for example, incorporate features like news feeds, event calendars, and feedback mechanisms, ensuring the app is accessible and provides a secure and user-friendly experience on any device.

Security Assessment Tool Development: Build a tool that assesses the security posture of the company's IT infrastructure or software applications. The apprentice may, for example, develop functionalities to automatically detect vulnerabilities and suggest mitigation strategies, applying best practices in secure coding to ensure the tool itself is robust against attacks.

Automated Software Testing Suite: Implement an automated testing suite to support the continuous integration and deployment pipeline, aiming to improve the quality and reliability of software releases. The apprentice may, for example, select appropriate testing frameworks, design test cases that cover a wide range of scenarios, and integrate the suite with existing development tools for automated execution and reporting.

Internal Collaboration and Project Management Tool Enhancement: Enhance the company's existing internal tools for collaboration and project management by adding new features or improving existing ones for better usability and efficiency. The apprentice may, for example, conduct user research to identify pain points, design solutions to address these issues, and manage the rollout of updates to ensure they are adopted smoothly by the workforce.

Code Quality and Compliance Monitoring System: Develop a system to monitor and improve the quality and compliance of code written within the company, focusing on adherence to coding standards and best practices. The apprentice may, for example, integrate static code analysis tools, set up a dashboard to track compliance metrics, and create guidelines and training materials to help developers write cleaner, more efficient code.

Data Analyst

Customer Segmentation and Targeting Project: Develop a project focused on analysing customer data to segment the customer base into distinct groups based on purchasing behaviour, preferences, and demographics. The apprentice may, for example, use clustering techniques to identify customer segments and analyse their characteristics, helping the marketing team to tailor strategies and improve customer engagement and retention.

Sales Forecasting Model Development: Work on creating a predictive model for forecasting sales based on historical sales data, market trends, and external economic indicators. The apprentice may, for example, employ time series analysis and machine learning algorithms to predict future sales, assisting the finance and sales departments in planning and resource allocation.

Operational Efficiency Analysis: Undertake a project to analyse internal operational data to identify areas for process improvement and efficiency gains. The apprentice may, for example, use data mining techniques to uncover bottlenecks in production or service delivery processes and recommend solutions to reduce costs and improve service quality.

Social Media Sentiment Analysis: Conduct a sentiment analysis project using data from social media platforms to gauge customer sentiment towards the company's products or services. The apprentice may, for

example, apply natural language processing (NLP) techniques to analyse comments and reviews, providing valuable feedback to the product development and marketing teams.

Inventory Management Optimization: Develop an analytics project aimed at optimising inventory levels using historical sales data, lead times, and demand forecasting. The apprentice may, for example, implement inventory management models to minimise holding costs and reduce stockouts, thereby improving supply chain efficiency.

Website Traffic and Conversion Analysis: Carry out an analysis of website traffic data to understand user behaviour and identify factors influencing conversion rates. The apprentice may, for example, use web analytics tools to track user paths, analyse bounce rates, and test changes to web page layouts or content to increase conversions.

Fraud Detection System: Create a project focused on developing a fraud detection system using transaction data. The apprentice may, for example, use anomaly detection algorithms to identify suspicious activities, helping to protect the company from potential financial losses and enhance security measures.

Employee Performance and Retention Analysis: Analyse employee data to identify patterns and predictors of employee performance and retention. The apprentice may, for example, apply statistical analysis and predictive modelling to help the HR department develop strategies for talent management and reduce turnover rates.

Regulatory Compliance and Data Protection: Advise a client on achieving compliance with data protection regulations such as GDPR. The consultancy includes auditing current data handling practices, recommending improvements to ensure compliance, and training staff on data protection measures.

Development of a Data Analytics Dashboard: Create a versatile data analytics dashboard that can be customised for various departments within the company, such as sales, marketing, or operations. The apprentice may, for example, design an intuitive user interface, develop data integration pipelines to gather data from multiple sources, and implement visualisation tools to present actionable insights in real-time.

Cyber Security Analyst

1. Overview:

A project in a cybersecurity apprenticeship is a project that requires the apprentice to conduct research and apply their findings to a real-world cybersecurity challenge.

2. Key Aspects of a Cyber Security Project:

Problem Identification: The apprentice identifies a specific cybersecurity issue or challenge that needs to be addressed. This could involve anything from vulnerability assessment to incident response planning.

Research : The apprentice conducts a thorough review of existing research and investigation related to the chosen problem. This helps them understand the current state of knowledge and identify potential solutions.

Data Collection and Analysis: The apprentice may need to collect and analyze data to support their research. This could involve conducting surveys, analyzing network traffic, or performing penetration testing.

Experiment phase: Simulation Solutions Development: Based on their research, investigation and analysis, the apprentice develops a simulation solution to the identified problem.

3. Simulation Solutions

Cyber security projects require the use of simulation solutions. Here's why and how:

Why Use Simulation?

- *Cost-effectiveness:* Setting up real-world cyber security scenarios can be expensive, requiring hardware, software, and personnel. Simulation offers a cost-effective alternative.
- *Safety:* Testing new security tools or strategies in a live network can be risky. Simulation provides a safe environment to experiment without the risk of damaging real systems.
- *Scalability:* Simulating large and complex networks is easier and more manageable than setting up physical ones.
- *Reproducibility:* Simulations allow researchers to easily recreate scenarios, ensuring consistent and comparable results.
- *Flexibility:* Simulations can be easily modified to test different attack vectors, security measures, and network configurations.

3.1 Types of Simulation Solutions

Network Simulators:

Purpose: Model network traffic, protocols, and topologies to study network behavior and security.

Examples: CISCO Packet Tracer, NS3, OMNeT++, Mininet, GNS3

** Please note that while we have listed some open-source platforms here, some of the suggested platforms do not offer all features for free. At Ada, we only have a license for the TryHackMe platform.*

Cyber Range Environments:

Purpose: Provide a virtual environment for realistic cyber security training and testing.

Examples: TryHackMe, Cyberbit, SimSpace, Immersive Labs

Attack Simulation Tools:

Purpose: Simulate cyber attacks to evaluate the effectiveness of defenses and identify vulnerabilities.

Examples: Metasploit, Kali Linux, Core Impact

3.2 Tips for Using Simulation in Cyber Security Projects

- Clearly define your goals and objectives.
- Choose the right simulation tools for your needs.
- Design realistic scenarios that reflect real-world threats.
- Collect and analyse data carefully.
- Validate your simulation results whenever possible

Validating the simulation results compares the outcomes of the simulated results against real-world data and known threat behaviors, ensuring the simulation accurately reflects potential vulnerabilities and threat scenarios, allowing for reliable analysis and informed security decision-making.

4. Choosing the Right Solution

The best simulation solution for your project will depend on several factors:

Project goals: What are you trying to achieve with your research?

Scope: How large and complex is the system you need to simulate?

Resources: What is your budget and what expertise do you have available?

Specific needs: Do you need to simulate specific attacks, network protocols, or user behaviours

5. Expected output

The final output of a project is achieved by turning the design to a “Solution Simulations”, where the simulation demonstrates that the proposed solutions are optimal by highlighting their efficacy in addressing identified risks.

However, this may involve implementing a small-scale version of the proposed security solution (or approach) to validate its effectiveness in addressing specific vulnerabilities or threats. The implementation here is limited to developing a mock-up or model that demonstrates the solution's functionality.

6. Examples of Projects

6.1 Projects that involve investigation and/or research

- *Vulnerability Assessment of a Web Application:* The apprentice could research common web application vulnerabilities and conduct a penetration test on a real or simulated web application to identify and report any weaknesses.
- *Analysis of a Recent Cyberattack:* The apprentice could research a recent cyberattack, analyse the attack vectors used, and propose recommendations for preventing similar attacks in the future. A recent cyberattack analysis, when paired with simulations, allows organizations to deeply understand the tactics, techniques, and procedures (TTPs) used by attackers, identify vulnerabilities in their systems, and proactively recommend security measures to mitigate future similar threats by replicating the attack scenario in a controlled environment to test their response capabilities and identify weaknesses in their defences.
- *Evaluation of a New Cybersecurity Technology:* The apprentice could research a new cybersecurity technology, such as artificial intelligence-based threat detection, and evaluate its effectiveness in a real-world setting.

6.2 More General Projects

Network Protection Projects

Network protection is a vital part of any organization's cybersecurity infrastructure. Final-year students can take on Network Protection Projects to develop systems that protect data and ensure secure communication across various networks. Some project ideas include designing a firewall system, implementing an intrusion detection system (IDS), or creating an encrypted communication system using VPN technology.

A Network Protection Project allows students to understand network traffic analysis, data encryption, and various defensive mechanisms. By working on Final Year Cyber Security Projects, students gain skills in securing networks against hacking attempts and DDoS attacks.

Ethical Hacking Projects

Ethical hacking plays a key role in cybersecurity by identifying vulnerabilities before malicious hackers can exploit them. As a student, taking on Ethical Hacking Projects will help you understand the mindset of a hacker while learning the necessary skills to protect digital assets. Potential projects include penetration testing, reverse engineering, or developing tools to simulate cyber-attacks. By working on ethical hacking projects, you

will gain practical knowledge in penetration testing, security audits, and vulnerability management, which are in high demand by cybersecurity professionals globally.

Security Awareness Projects

One of the best ways to combat cyber threats is through education. A Security Awareness Project is an excellent way for final-year students to promote cybersecurity best practices in the community. Project ideas can include developing an awareness campaign for phishing attacks, creating a web-based platform to train employees on cybersecurity practices, or implementing a company-wide security awareness program.

Working on Security Awareness Projects helps students understand the importance of human factors in cybersecurity. They can explore techniques for educating users about password management, data protection, and safe internet practices. Final Year Cyber Security Projects help students understand the human element of cybersecurity and develop skills in communication and training, making them more valuable in the growing cybersecurity industry.

Cloud Security Solutions

Cloud security is becoming a major concern as more organizations move to cloud-based infrastructures. As part of your Final Year Cyber Security Projects, you can explore various cloud security solutions to secure cloud environments. These solutions focus on preventing unauthorized access, securing data, and ensuring the confidentiality of cloud resources.

You could work on a cloud-based intrusion detection system (IDS), where your project involves monitoring cloud-based resources for suspicious activities and security threats. You can also design an encrypted cloud storage system to ensure data privacy, or work on multi-factor authentication (MFA) for cloud applications. Tools such as Amazon Web Services (AWS) and Microsoft Azure provide students with the platform to build and deploy security solutions on the cloud.

By engaging in cloud security projects, students gain essential skills in securing digital assets in a rapidly growing cloud computing environment. Final Year Cybersecurity Projects can also lead to further exploration into cloud security certifications, making them valuable for students aspiring to specialize in cloud security.

Threat Hunting Projects

Threat hunting involves actively searching for signs of malicious activity or potential threats within an organization's IT infrastructure. For your Final Year Cyber Security Projects, you can work on a threat hunting project where you design and implement a system that proactively identifies hidden threats or suspicious

activities within a network. Final Year Cybersecurity Projects could involve creating a tool that analyzes network traffic, logs, or endpoint data to detect anomalies that could signify a cyberattack.

With Final Year Cyber Security Projects, students gain practical experience in mitigating risks by detecting threats early, a skill that is highly sought after in the cybersecurity field.

Security Auditing Tools

As part of your Final Year Cyber Security Projects, you can explore security auditing tools designed to assess the effectiveness of an organization's security measures. Security auditing involves evaluating the integrity and security of an organization's IT infrastructure by running tests to identify vulnerabilities, weaknesses, and non-compliance with security standards. Your project could involve creating a security auditing tool that scans an organization's network for potential vulnerabilities, misconfigurations, or outdated software. This tool could generate reports with recommendations for improving security practices. With a project focused on security auditing, students gain a deeper understanding of risk management, compliance, and industry-standard security protocols.